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(54) **Endoscopic Instrument system**

**Endoskopisches Instrumentensystem**  
**Système d'instruments endoscopiques**

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## Description

The present invention relates to an endoscopic instrument system for surgical use, for example an endoscopy scissors instrument suitable for use with a trocar or cannula.

A branch of endoscopic surgery is laparoscopic surgery which involves the use of a cannula that is inserted through an incision in the skin of the subject to provide access to an internal cavity, such as the thoracic cavity. An example of such a cannula is disclosed in Hasson U.S. Patent No. 5,002,557. Surgery is performed with a laparoscopic instrument, which typically includes a scissors handle and an elongate shaft terminating in a pair of pivoting jaws. The handle includes a scissors or pliers grip which, when squeezed and released, reciprocates a rod extending through the shaft to pivot the jaws. The jaws and shaft are sized to be inserted through the cannula into the body cavity where the surgery is to be performed. Similar devices are employed in thoroscopic and arthroscopic surgery.

WO91/02493 which forms the basis of the preambles of the independent claims 1, 18 and 25 discloses a device having two elongate elements at least a portion of which is formed from a pseudoelastic material. The elements are moved towards and away from each other to grasp or cut an object. The device may include actuating means.

As with any surgical instrument, should the tool include sharpened jaws for cutting, it is desirable to maintain the sharpened edges as sharp as possible for each operation. Further, it is also desirable to design the instrument so that it can be easily and thoroughly cleaned after each operation. However, disadvantages with unitary instruments; that is, instruments in which the handle, shaft and cutting tool are permanently attached to each other, is that cleaning of the instrument and sharpening of the tool after each operation becomes time-consuming and costly.

Accordingly, attempts have been made to provide laparoscopy instruments which minimize the time and expense of cleaning and sharpening. For example, some laparoscopy instruments are made in which substantially the entire instrument is constructed in plastics, except for the shaft rod and jaws, so that the entire instrument is disposable after each operation. Alternately, instruments such as those disclosed in Falk *et al.* U.S. Patent No: 4 569 131 are designed in which the handle is separable from the shaft and jaws, so that the unitary shaft, jaws and rod may be disposed after each use, or cleaned and sharpened separately from the handle. Disadvantages we have found with these types of designs is that the disposable component -- whether it be the entire instrument or only the shaft and cutting tool -- provide an undesirably high volume of medical waste which requires special disposal procedures. Further, disposable instruments made largely of plastic are somewhat flimsy and difficult to manoeuvre.

Accordingly, there is a continuing need, not satis-

fied prior to the present invention, for a laparoscopy instrument which eliminates the need for repeated sharpening of the cutting surfaces of the instrument and which facilitates cleaning and reduces cross-contamination potential.

In accordance with a first aspect of the present invention, we provide an endoscopic instrument system comprising: an instrument including a handle portion having means for gripping said instrument, means forming a shaft extending from said gripping means and means for actuating said instrument; and an instrument end tool comprising jaw means forming a pair of jaws, characterized in that said end tool comprises support means supporting said jaw means, such that said support means is removably mountable on an end of said shaft and including means for engaging said actuating means, whereby an end tool is operable by said actuating means such that at least one of the jaws can move relative to the other.

The present invention provides in a second and alternative aspect thereof a disposable end tool comprising jaw means forming a pair of jaws adapted for use with an endoscopic instrument of a type having a handle portion including means for gripping said instrument, means forming an elongate shaft extending from said gripping means and means for actuating said instrument; the end tool being characterised in comprising support means, preferably plastics, operatively supporting said jaw means such that the jaws can move relative to each other, and in that said support means is attachable to said shaft end in a manner enabling coaction with said actuating means so that operation of the actuating means is effective to move said jaw means.

In a preferred embodiment the end tool is adapted for use in an instrument in which said shaft has a threaded open end opposite said gripping means, and rod means for actuating said instrument, said rod means being mounted within said shaft for slidable movement by said gripping means and having a clevis end adjacent said shaft end, the end tool being characterised in comprising: a support having a threaded inner end shaped to enable it to be threaded into said shaft end; a stub shaft mounted within said support for reciprocal movement and having an enlarged end protruding from said inner end shaped to enable it releasably to engage said clevis end; first and second links pivotally attached to said stub shaft within said support; and first and second jaws pivotally mounted on said support to effect a scissors movement, said first and second jaws being pivotally connected to said first and second links, respectively, whereby, in operation of said instrument incorporating said end tool, movement of said rod is effective to reciprocate said stub shaft whereby to effect said scissors movement of said jaws.

In a third alternative aspect of the present invention there is provided a method of using an endoscopic instrument system comprising the steps of: selecting an endoscopic instrument of a type having a handle portion including means for gripping said instrument, means

forming a shaft extending from said gripping means and means for actuating said instrument; selecting an instrument end tool of a type having means for replaceably mounting said end tool on an end of said shaft and including means for engaging said actuating means, whereby said end tool is operable by said actuating means; mounting said end tool on said shaft; and subsequent to use of said instrument and end tool, removing said end tool from said shaft.

In a preferred embodiment the said end tool is selected from among a plurality of end tools having different configurations for performing different tasks.

In preferred embodiments, each of the end tools includes pivoting jaws which actually contact the tissue of the subject during the operation. The end tools preferably include plastics components which lower their cost, and are disposable. One advantage is that the disposable component of the entire instrument is relatively small, thereby minimizing the cost of using the instrument over several operations and minimizing the volume of medical waste comprised by the disposable components of the instrument.

In a preferred embodiment, the handle portion includes pivoting scissor handles and an actuating rod which extends through the shaft. The rod terminates in a clevis which receives the hemispherical tip of a stub shaft that is reciprocally mounted within the end tool. The stub shaft is connected to a pair of pivoting jaws by links so that reciprocal movement of the stub shaft causes the jaws to pivot relative to the end tool in a scissors fashion.

Preferably the support of the end tool is made of a glass fibre reinforced plastic and threads onto the open end of the handle shaft. The pivoting jaws of the end tools may be formed to perform a variety of tasks; for example, the jaws can be in the form of scissors, graspers, biopsy, or dissectors.

Another advantage is that only the portions of the instrument which become most contaminated during an operation and are most difficult to clean (namely, the jaws and linkage operating the jaws) are disposed of with the end tool. In the preferred embodiment, a cleaning port extends through the handle portion and facilitates the flushing of the shaft with an appropriate liquid cleaning agent after each operation. A direct result of incorporating our laparoscopy instrument system in a hospital operating room procedure is that a relatively few handle portions need be present while having a relatively larger number of end tools, in contrast to prior procedures in which an extensive array of unitary instrument must be present. Further, each surgeon may be provided with a set of end tools, each performing a different function, and each selected from an array of end tools to suit the particular surgeon's needs and preferences.

It will thus be seen that preferred embodiments of our endoscopic instrument system can eliminate the need for repeatedly sharpening the cutting jaws of the instrument; can allow the linkage components which are

the most difficult to clean to be disposable, thereby obviating the necessity for repeated cleaning; can have a shaft portion which is easily cleaned after each operation; can have cutting surfaces and linkages which are disposable, but in a manner such that the volume of disposed equipment is minimized; can have a disposable cutting element in which the support component is made of a relatively inexpensive plastics material; can have a plurality of attachable end tools which can be customized for a particular practitioner or application; and are relatively easy to manufacture and utilize.

The invention is hereinafter more particularly described with reference to and as shown in the accompanying drawings, in which:-

Fig. 1 is a side elevation of the handle portion and one end tool of a preferred embodiment of endoscopic instrument system constructed according to the present invention;

Fig. 2 is a section taken at line 2-2 of Fig. 1;

Fig. 3 is a section taken at line 3-3 of Fig. 1;

Fig. 4 is a detail of the instrument of Fig. 1 showing the shaft end in section and a portion of the end tool broken away;

Fig. 5 is the detail of Fig. 4 in which the tool jaws have been pivoted to an open position;

Fig. 6 is a side elevation of a gripper end tool for use in the system of Fig. 1;

Fig. 7 is a side elevation of a biopsy end tool for use in the system of Fig. 1;

Fig. 8 is a side elevation of a dissector end tool for use in the system of Fig. 1.

As shown in Fig. 1, the endoscopic instrument system illustrated, generally designated 10, includes a handle portion, generally designated 12, and an end tool, generally designated 14. The handle portion 12 includes a scissors component 16 which is gripped by the user and has front and rear scissors handles 17, 18, respectively. Scissors handles 17 and 18 include finger loops 20, 22.

Scissors handle 17 is attached to a cylindrical housing 24 and includes a clevis 26 which is engaged by scissors handle 18 and secured by a screw 28. When scissor handles 17, 18 are pivoted relative to each other about screw 28, the upper end 30 of handle 18 reciprocates relative to the housing 24.

As shown in Fig. 2, the housing 24 includes a hollow interior 32 which receives an inner sleeve 34 of a rotatable coupling 36. The inner sleeve 34 includes a flange 38 having a plurality of orifices 40 spaced about its periphery. The coupling 36 includes a coupling body 42 having a plurality of cylindrical cavities 44, each receiving an extension spring 46 which urges a ball 48 against an adjacent one of the orifices 40. The balls 48 are larger in diameter than the orifices so that the orifices merely provide seats for the balls 48. The inner end 50 of the coupling body 36 includes an annular groove 52 which receives a split ring 54. The split ring

54 retains the coupling body 42 on the flange 38. The body 42 is unitary with a hollow, elongate shaft 56 (see also Fig. 1). While the shaft 56 of the preferred embodiment is made of surgical stainless steel, it is within the scope of the invention to provide a flexible shaft.

The external surface of the body 42 is knurled to facilitate grasping by a user. The coupling 36 enables the shaft 56 to be rotated relative to the housing 24 of the handle portion 12, and the engagement of ball 48 and orifices 40 provide detent stops.

The housing portion 24 includes a lateral tube 57 which is capped by a removable nut 58 and communicates with the interior 32 of the housing. The tube 57 extends through an opening 60 in the sleeve 34 to communicate with the interior 62 of the coupling 36 and shaft 56.

The handle portion 12 includes a rod 64 which extends through the interiors 62, 32 of the shaft 56 and housing 24, respectively. The rod includes an enlarged, cylindrical segment 66 which engages the interior or internal wall of the sleeve 34 for location purposes and a rear segment 68 which protrudes through an end opening 70 in the housing 24 to terminate in a spherical end 72. The housing 24 includes a plastic end cap 74 mounted in a dovetail slot 75 which provides a seal about the extension 68. The extension 68 passes through an orifice 76 in the cap and the end 72 of the extension is received within a clevis 78 formed in the upper end 30 of the handle 18. Consequently, pivoting movement of the handle 18 relative to handle 17 causes the upper end 30 to reciprocate relative to the housing 24, causing the rod 64 to reciprocate relative to the handle portion 12.

As shown in Fig. 3, the outer end 80 of the shaft 56 includes a threaded interior surface 82. The end 84 of the rod 64 includes a clevis 86. The end tool 14 includes a support 88, preferably made of a glass filled plastic, such as 40% glass filled polyetherimide. Other plastics include polyethersulfone and polyetheretherketone. Support 88 has a threaded inner end 90 which is shaped to thread into the threaded interior 82 of the end 80 of shaft 56. The support 88 mounts a pair of jaws 92, 94, which are best shown in Fig. 4.

The support 88 includes a pair of arms 96, 98 (see Fig. 3) which receive a rivet 100 that mounts the jaws 92, 94 for pivotal movement relative to the support and to each other. The jaws 92, 94 each include ears 102, 104 which are pivotally attached to links 106, 108 by rivets 110, 112. The links 106, 108 are, in turn, pivotally attached to a knuckle 114 by a rivet 116. The knuckle 114 forms a portion of a stub shaft 118 which is slidably mounted within a passage 120 formed in the support 88. The stub shaft is sized such that an inner end 122 protrudes rearwardly from the threaded end 90 and terminates in a hemispherical tip 124 which is shaped to be seated within the clevis 86.

As shown in Fig. 5, displacement of the rod 64 relative to the shaft 56 by pivoting the handle 17, 18 in the manner previously described causes the end 84 of the

rod to displace the stub shaft 118 outwardly relative to the support 88. This outward displacement causes the links 106, 108 to pivot the jaws 92, 94 outwardly away from each other. Conversely, displacement of the rod 64 inwardly, caused by squeezing the handles 17, 18 together (see Fig. 1), causes the stub shaft 118 to be displaced inwardly relative to the support 88, so that the links 106, 108 draw the jaws 92, 94 together. Consequently, pivotal movement of handle 18 relative to handle 17 causes the jaws 92, 94 to pivot relative to each other.

To remove the end tool 14 from the shaft 56, the support 88 is first threaded out of the threaded end 80 of the shaft 56. The loops 20, 22 of the handles 17, 18 are drawn together, which displaces the rod end 84 outwardly from the shaft end 80, exposing the clevis 86. Once the rod end 84 clears the shaft end 80, the tip 124 of the stub shaft 118 can be removed from the clevis 86 and the entire end tool 14 discarded. It is not necessary to remove the rod 64 from the handle portion 12 or disconnect the extension 68 from the handle upper end 30.

Reattachment of a fresh end tool 14 is accomplished by reversing the aforementioned sequence of steps. Specifically, a fresh tool 14 is placed adjacent to the shaft end 80 and the tip 124 placed into the clevis 86. The handles 17, 18 are spread slightly and the support 88 is threaded into the shaft end 80. In the preferred embodiment, the threaded end 90 of the support 88 includes bosses 126 which are deformed by the threads of the threaded end 80 to prevent the inadvertent unthreading of the end tool 14.

To clean the handle portion 12 of the instrument system 10, the tip 14 is first removed as previously described. Then, the nut 58 is removed from the tube 57 and a cleaning solvent is flushed through the interiors 32, 62 of the housing 24 and shaft 56 so that the solvent exists the end 80 of the shaft, thereby flushing any debris from the shaft. However, it should be noted that the connection of the tip 14 with the shaft end 80 minimizes the entry of contaminants within the interior 62, since the only openings are the seam between the shaft end and support 88 and the passage 120 and stub shaft 118.

Figs. 6, 7 and 8 show alternate embodiments of the end tool 14A, 14B, 14C, each designed to perform a specialized function and forming a component of the system 10. In 14A, the jaws 92A, 94A include rear-facing sawtooth edges 128 such that the tip 14A forms an alligator grasper. In Fig. 7, the end tool 14B includes jaws 92B, 94B which are shaped to form a biopsy. In Fig. 8, the end tool 14C includes jaws 92C, 94C having sawtooth edges 130 to form a dissector.

#### Claims

1. An endoscopic instrument system (10) comprising: an instrument including a handle portion (12) having means (36) for gripping said instrument, means forming a shaft (56) extending from said gripping

means and means for actuating said instrument; and an instrument end tool (14) comprising jaw means (92, 94) forming a pair of jaws, characterized in that said end tool (14) comprises support means (88) supporting said jaw means (92, 94), such that said support means (88) is removably mountable on an end of said shaft (56) and including means (124) for engaging said actuating means, whereby said end tool (14) is operable by said actuating means such that at least one of the jaws (92, 94) can move relative to the other.

2. An endoscopic instrument system according to Claim 1, further characterised in that said gripping means (36) operates said actuating means.
3. An endoscopic instrument system according to Claim 2, characterised in that said actuating means extends through said shaft (56) from said gripping means (36) to an attached end tool (14).
4. An endoscopic instrument system according to any preceding claim, further characterised in that said end tool (14) includes scissors (92, 94).
5. An endoscopic instrument system according to any preceding claim, further characterised in that said end tool (14) is connectable to said shaft (56) end by a threaded engagement (82, 90).
6. An endoscopic instrument system according to any preceding claim, further characterised in that said actuating means includes a rod (64) extending from said gripping means (36) to an end tool (14) mounted on said shaft end (80).
7. An endoscopic instrument system according to Claim 6, further characterised in that said end tool (14) includes means for engaging said rod (64).
8. An endoscopic instrument system according to any preceding claim, further characterised in that said end tool (14) includes link means (106, 108) terminating in an enlarged end (124), and said actuating means includes means (86) for releasably engaging said enlarged end.
9. An endoscopic instrument system according to Claim 8, further characterised in that said engaging means includes clevis means (86) for receiving said enlarged end (124) of an attached end tool (14).
10. An endoscopic instrument system according to Claim 8, further characterised in that the support (88) of the end tool (14), attachable to said shaft (56) end, receives said link means (106, 108), a first said jaw pivotally attached to said support (88) and to said link means (106, 108) and a second said jaw at to said support (88), whereby movement of said

link means (106, 108) in response to movement of said actuating means causes said first jaw to pivot relative to said support and to said second jaw.

11. An endoscopic instrument system according to Claim 10, further characterised in that said link means (106, 108) includes a stub rod (118) having said enlarged end (124) and being slidably received in said support (88), and a first link element (106, 108) interconnecting said stub rod (118) and said first jaw (92, 94), whereby sliding movement of said stub rod (118) is transmitted through said link element (106, 108) to pivot said first jaw.
12. An endoscopic instrument system according to Claim 11, further characterised in that said second jaw is pivotally attached to said support (88), and said link means (106, 108) includes a second link element interconnecting said stub rod (118) and said second jaw, whereby said sliding movement of said stub rod (118) causes said first and second jaws to pivot relative to each other in a scissors movement.
13. An endoscopic instrument system according to Claim 12, further characterised in that said first and second jaws (92, 94) comprise jaws of a scissors, of a dissector, of a grasper, or of a biopsy.
14. An endoscopic instrument system according to any preceding claim, further characterised in that said shaft (56) is rotatably mounted on said gripping means (36).
15. An endoscopic instrument system according to any of Claims 1 to 13, further characterised in that said shaft (56) is removable from said gripping means (36).
16. An endoscopic instrument system according to any preceding claim, further characterised in that said gripping means (36) includes port means (57, 58) for flushing said shaft.
17. An endoscopic instrument system according to Claim 16, further characterised in that said port means (57, 58) includes a stub tube (57) threaded into said gripping means communicating with said shaft (56).
18. A disposable end tool (14) comprising jaw means (92, 94) forming a pair of jaws adapted for use with an endoscopic instrument (10) of a type having a handle portion (12) including means (36) for gripping said instrument, means forming an elongate shaft (56) extending from said gripping means (36) and means for actuating said instrument; the end tool (14) being characterised in comprising support means (88), preferably plastics, operatively sup-

- porting said jaw means (92, 94) such that the jaws (92, 94) can move relative to each other, and in that said support means 88 is attachable to a shaft end (80) in a manner enabling coaction with actuating means so that operation of the actuating means is effective to move said jaw means (92, 94). 5
19. An end tool according to Claim 18, further characterised in that said support means (88) includes an inner end (90) adapted to mount on said shaft end (80). 10
20. An end tool according to Claim 19, further characterised in that said inner end (90) includes a threaded portion shaped to thread into said shaft end (80). 15
21. An end tool according to any of Claims 18 to 20, further characterised in that said jaw means (92, 94) include a stub shaft (118) slidably mounted in said support means (88) and adapted to engage said actuating means. 20
22. An end tool according to Claim 21 as appendant to Claims 19 or 20, further characterised in that said stub shaft (118) includes an enlarged end (124) protruding from said inner end and shaped to engage said actuating means. 25
23. An end tool according to any of Claims 18 to 22, further characterised in that said jaw means (92, 94) includes first and second jaws, said jaws being pivotally attached to said support means (88). 30
24. An end tool according to both Claim 23 and one of Claims 21 or 22, further characterised in that said jaw means (92, 94) includes first and second links (106, 108) interconnecting said first and second jaws (92, 94), respectively, with said stub shaft (118), whereby, in operation of a instrument incorporating said end tool (14), reciprocating movement of said stub shaft (118) relative to said support means (88) in response to said actuating means is effective to cause said jaws (92, 94) to pivot relative to each other. 35 40 45
25. An end tool according to Claims 23 or 24 further characterised in that said jaws (92, 94) form a scissors, a grasper, biopsy, or a dissector. 50
26. An end tool according to any of Claims 18 to 25, further characterised in that said support means (88) is made of a glass filled polyetherimide, a glass filled polyetheretherketone or a glass filled polyethersulfone. 55
27. A disposable end tool (14) according to Claim 18 wherein the end tool is adapted for use with an instrument (10) in which said shaft (56) has a

threaded open end (82) opposite said gripping means (36), said means for actuating said instrument comprising rod (64) means being mounted within said shaft (56) for slidable movement by said gripping means and having a clevis end adjacent said end, the end tool (14) being characterised in comprising a support (88) having a threaded inner end (90) shaped to enable it to be threaded into said shaft end (80); a stub shaft (118) mounted within said support (88) for reciprocal movement and having an enlarged end (124) protruding from said inner end shaped to enable it releasably to engage said clevis (86) end; first and second links (106, 108) pivotally attached to said stub shaft (118) within said support (88); and further characterised in that said first and second jaws (92, 94) are pivotally mounted on said support (88) to effect a scissors movement, said first and second jaws (92, 94) being pivotally connected to said first and second links (106, 108), respectively, whereby in operation of said instrument incorporating said end tool (14), reciprocating movement of said rod (64) is effective to reciprocate said stub shaft (118) whereby to effect said scissors movement of said jaws (92, 94).

28. A method of using the endoscopic instrument system (10) of any of Claims 1 to 17 comprising the steps of: selecting an endoscopic instrument (10) having a handle portion (16) including means (36) for gripping said instrument, means forming a shaft (56) extending from said gripping means and means for actuating said instrument; selecting an instrument end tool (14) of a type having means for replaceably mounting said end tool (14) on an end of said shaft (56) and including means for engaging said actuating means, whereby said end tool (14) is operable by said actuating means; mounting said end tool (14) on said shaft (56); and subsequent to use of said instrument and end tool, removing said end tool (14) from tool from said shaft (56).
29. A method according to Claim 28 of using the endoscopic instrument system of any of Claims 1 to 17 wherein said end tool (14) is selected from among a plurality of end tools (14) having different configurations for performing different tasks.

#### Patentansprüche

1. Endoskopische Instrumentensystem (10) aufweisend: ein Instrument umfassend einen Griffteil (12) mit einer Einrichtung (36) zum Ergreifen des Instrumentes, eine Einrichtung, die eine Welle (56) bildet und sich von der Griffeneinrichtung erstreckt, und eine Einrichtung zur Betätigung des Instrumentes; und ein Instrumenten-Endwerkzeug (14), welches eine Klemmbackeneinrichtung, (92, 94) umfaßt, die ein Paar von Klemmbacken bildet, dadurch gekenn-

- zeichnet, daß das Endwerkzeug (14) eine Stützeinrichtung (88) umfaßt, die die Klemmbackeneinrichtung (92, 94) so abstützt, daß die Stützeinrichtung (88) entfernbar auf einem Ende der Welle (56) angeordnet ist, und eine Einrichtung (124) zum Eingriff mit der Betätigungseinrichtung, wobei das Endwerkzeug durch die Betätigungseinrichtung so betätigbar ist, daß sich wenigstens eine der Klemmbacken (92, 94) relativ zu der anderen bewegen kann.
2. Endoskopisches Instrumentensystem nach Anspruch 1 ferner dadurch gekennzeichnet, daß die Greifeinrichtung (36) die Betätigungseinrichtung betätigt.
  3. Endoskopisches Instrumentensystem nach Anspruch 2, dadurch gekennzeichnet, daß sich die Betätigungseinrichtung durch die Welle (56) von der Greifeinrichtung (36) zu einem befestigtem Endwerkzeug (14) erstreckt.
  4. Endoskopisches Instrumentensystem gemäß irgendeinem vorhergehenden Anspruch, ferner gekennzeichnet dadurch, daß das Endwerkzeug (14) Scheren(92, 94) umfaßt.
  5. Endoskopisches Instrumentensystem nach irgendeinem vorhergehenden Anspruch, ferner gekennzeichnet dadurch, daß das Endwerkzeug (14) mit dem Ende der Welle (56) durch einen Schraubeingriff (82, 90) verbindbar ist.
  6. Endoskopisches Instrumentensystem nach irgendeinem vorhergehenden Anspruch, ferner dadurch gekennzeichnet, daß die Betätigungseinrichtung eine Stange (64) umfaßt, die sich von der Greifeinrichtung (36) zu einem Endwerkzeug (14) erstreckt, das auf dem Wellenende (80) gelagert ist.
  7. Endoskopisches Instrumentensystem nach Anspruch 6, ferner dadurch gekennzeichnet, daß das Endwerkzeug (14) eine Einrichtung zum Eingriff mit der Stange (64) umfaßt.
  8. Endoskopisches Instrumentensystem nach irgendeinem vorhergehenden Anspruch, ferner dadurch gekennzeichnet, daß das Endwerkzeug (14) Verbindungsmittel (106, 108) umfaßt, die in einem vergrößerten Ende (124) enden und daß die Betätigungseinrichtung Mittel (86) umfaßt um freigebbar mit dem vergrößerten Ende in Eingriff zu gelangen.
  9. Endoskopisches Instrumentensystem nach Anspruch 8, ferner dadurch gekennzeichnet, daß die Eingriffeinrichtung einen Zughaken (86) zur Aufnahme des vergrößerten Endes (124) eines befestigten Endwerkzeuges (14) umfaßt.
  10. Endoskopisches Instrumentensystem gemäß Anspruch 8, ferner dadurch gekennzeichnet, daß die Abstützung (88) des Endwerkzeuges (14), die mit der Welle (56) befestigbar ist, die Verbindungseinrichtung (106, 108) aufnimmt, daß eine erste Klemmbacke schwenkbar mit der Abstützung (88) und der Verbindungseinrichtung (106, 108) befestigt ist, und eine zweite Klemmbacke mit der Abstützung (88) befestigt ist, wobei eine Bewegung der Verbindungseinrichtung (106, 108) aufgrund der Bewegung der Betätigungseinrichtung die erste Klemmbacke zum Schwenken relativ zu der Abstützung und der zweiten Klemmbacke veranlaßt.
  11. Endoskopisches Instrumentensystem nach Anspruch 10, ferner dadurch gekennzeichnet, daß die Verbindungseinrichtung (106, 108) eine Flanschstange (118) umfaßt, die das vergrößerte Ende (124) aufweist und gleitend in der Abstützung (88) aufgenommen wird und daß ein erstes Verbindungselement (106, 108) die Flanschstange (118) und die erste Klemmbacke (92, 94) verbindet, wobei eine Gleitbewegung der Flanschstange (118) durch das Verbindungselement (106, 108) übertragen wird, um die erste Klemmbacke zu schwenken.
  12. Endoskopisches Instrumentensystem nach Anspruch 11, ferner dadurch gekennzeichnet, daß die zweite Klemmbacke schwenkbar mit der Abstützung (88) befestigt ist, und daß die Verbindungseinrichtung (106, 108) ein zweites Verbindungselement umfaßt, das die Flanschstange (118) und die zweite Klemmbacke miteinander verbindet, wodurch die Gleitbewegung der Flanschstange (118) die erste und zweite Klemmbacke veranlaßt, relativ zueinander in einer Scherenbewegung zu schwenken.
  13. Endoskopisches Instrumentensystem nach Anspruch 12, ferner dadurch gekennzeichnet, daß die ersten und zweiten Klemmbacken (92, 94) Klemmbacken einer Schere, eines Zerlegers, eines Greifers oder eines Gewebeentferners umfassen.
  14. Endoskopisches Instrumentensystem nach irgendeinem vorhergehenden Anspruch, ferner dadurch gekennzeichnet, daß die Welle (56) rotierbar auf der Greifeinrichtung (36) gelagert ist.
  15. Endoskopisches Instrumentensystem nach irgendeinem der Ansprüche 1-13, ferner dadurch gekennzeichnet, daß die Welle (56) von der Greifeinrichtung (36) entfernbar ist.
  16. Endoskopisches Instrumentensystem nach irgendeinem vorhergehenden Anspruch, ferner dadurch gekennzeichnet, daß die Greifeinrichtung (36) eine Anschlußeinrichtung (57, 58) zum Spülen der Welle

umfaßt.

17. Endoskopisches Instrumentensystem nach Anspruch 16, ferner dadurch gekennzeichnet, daß die Anschlußeinrichtung (57, 58) ein Flanschrohr (57) umfaßt, das in die Greifeinrichtung eingeschraubt ist und mit der Welle (56) in Verbindung steht.
18. Wegwerf-Endwerkzeug (149) aufweisend eine Klemmbackeneinrichtung, (92, 94) die ein Paar von Klemmbacken bildet und zur Verwendung mit einem endoskopischen Instrument der Art geeignet ist, das umfaßt einen Griffteil (12) einschließlich einer Einrichtung (36) zum Greifen des Instrumentes, eine Einrichtung, die eine längliche Welle (56) bildet und sich von der Greifeinrichtung (36) erstreckt und eine Einrichtung zum Betätigen des Instrumentes; wobei das Endwerkzeug (14) dadurch gekennzeichnet ist, daß es eine Stützeinrichtung (88) vorzugsweise in Plastik umfaßt, die operativ die Klemmbackeneinrichtung (92, 94) so abstützt, daß sich die Klemmbacken (92, 94) relativ zueinander bewegen können, und daß die Stützeinrichtung (88) mit einem Wellenende (80) in einer Weise befestigbar ist, die das Zusammenwirken mit der Betätigungseinrichtung ermöglicht, so daß der Betrieb der Betätigungseinrichtung die Bewegung der Klemmbackeneinrichtung (92, 94) bewirkt.
19. Endwerkzeug nach Anspruch 18, ferner dadurch gekennzeichnet, daß die Stützeinrichtung (88) ein inneres Ende (90) umfaßt, das auf dem Wellenende (80) gelagert werden kann.
20. Endwerkzeug nach Anspruch 19, ferner dadurch gekennzeichnet, daß das innere Ende (90) einen geschraubten Teil umfaßt, der so geformt ist, um in das Schaftende (80) geschraubt zu werden.
21. Endwerkzeug nach irgendeinem der Ansprüche 18-20, ferner dadurch gekennzeichnet, daß die Klemmbackeneinrichtung (92, 94) eine Flanschswelle (118) umfaßt, die gleitend in der Stützeinrichtung (88) gelagert ist und geeignet ist, mit der Betätigungseinrichtung in Eingriff zu gelangen.
22. Endwerkzeug nach Anspruch 21 in Abhängigkeit von den Ansprüchen 19 oder 20, ferner dadurch gekennzeichnet, daß die Flanschswelle (118) ein vergrößertes Ende (124) umfaßt, das von dem inneren Ende vorsteht und so geformt ist, daß es mit der Betätigungseinrichtung in Eingriff gelangen kann.
23. Endwerkzeug nach irgendeinem der Ansprüche 18-22, ferner dadurch gekennzeichnet, daß die Klemmbackeneinrichtung (92, 94) erste und zweite Klemmbacken umfaßt, wobei die Klemmbacken

schwenkbar mit der Stützeinrichtung (88) befestigt sind.

24. Endwerkzeug sowohl gemäß Anspruch 23 als auch gemäß einem der Ansprüche 21 oder 22, ferner, dadurch gekennzeichnet, daß die Klemmbackeneinrichtung (92, 94) erste und zweite Verbindungen (106, 108) umfaßt, die die ersten und zweiten Klemmbacken (92, 94) entsprechend mit der Flanschswelle (118) verbinden, wobei im Betrieb eines Instrumentes, das dieses Endwerkzeug (14) umfaßt, eine hin- und hergehende Bewegung der Flanschswelle (118) relativ zu der Stützeinrichtung (88) in Abhängigkeit von der Betätigungseinrichtung wirksam ist, um ein Schwenken der Klemmbacken (92, 94) relativ zueinander zu veranlassen.
25. Endwerkzeug nach den Ansprüchen 23 und 24, ferner dadurch gekennzeichnet, daß die Klemmbacken (92, 94) eine Schere, einen Greifer, einen Gewebeentferner oder einen Zerleger bilden.
26. Endwerkzeug nach irgendeinem der Ansprüche 18-25, ferner dadurch gekennzeichnet, daß die Stützeinrichtung (88) aus einem glasgefüllten Polyetheretherimid, einem glasgefülltem Polyetherethersulfon oder einem glasgefülltem Polyethersulfon hergestellt ist.
27. Wegwerfbares Endwerkzeug (14) nach Anspruch 18, wobei das Endwerkzeug zur Verwendung mit einem Instrument geeignet ist, bei welchem die Welle (56) ein offenes Gewindeende (82) gegenüber der Greifeinrichtung (36) besitzt, die Einrichtung zu Betätigung des Instrumentes eine Stangeneinrichtung (56) umfaßt, die innerhalb der Welle (56) zur gleitenden Bewegung die Greifeinrichtung gelagert ist und ein Zughakenende benachbart zu dem Wellenende aufweist, wobei das Endwerkzeug (14) gekennzeichnet ist durch eine Abstützung (88) mit einem inneren Schraubende (90), das in das Wellenende (80) eingeschraubt werden kann; eine Flanschswelle (118), die innerhalb der Stützeinrichtung gelagert ist zur Hin- und Herbewegung und ein vergrößertes Ende (124) besitzt, das von dem inneren Ende hervorsteht und lösbar mit dem Zughakenende (86) in Eingriff gelangen kann; erste und zweite Verbindungen (106, 108), die schwenkbar mit der Flanschswelle (118) innerhalb der Stützeinrichtung (88) befestigt sind und ferner dadurch gekennzeichnet, daß die ersten und zweiten Klemmbacken (92, 94) schwenkbar auf der Abstützung (88) gelagert sind, um eine Scherenbewegung zu bewirken, daß die ersten und zweiten Klemmbacken (92, 94) schwenkbar mit den ersten und zweiten Verbindungen (106, 108) entsprechend verbunden sind, wobei im Betrieb des Instrumentes, das das Endwerkzeug (14) aufweist, eine hin- und hergehende



Bewegung der Stange (64) bewirkt, daß die Flanschelle (108) hin- und hergeht, wodurch die Scherenbewegung der Klemmbacken (92, 94) bewirkt wird.

28. Verfahren zur Verwendung des endoskopischen Instrumentensystems (19) nach irgendeinem der Ansprüche 1-17 umfassend die Schritte:

Auswahl eines endoskopischen Instrumentes (10) mit einem Griffteil (16) umfassend eine Einrichtung (36) zum Ergreifen des Instruments, eine Einrichtung, die eine Welle (56) bildet und sich von der Griffeinrichtung erstreckt und eine Einrichtung zur Betätigung des Instruments; Auswahl eines Instrumenten- Endwerkzeuges (14) der Art, das eine Einrichtung zum ersetzbaren Lagern des Endwerkzeuges (14) auf einem Ende der Welle (56) aufweist und eine Einrichtung umfaßt zum Eingriff mit der Betätigungseinrichtung, wobei das Endwerkzeug (14) durch die Betätigungseinrichtung betätigbar ist; Lagerung des Endwerkzeuges (14) auf der Welle (56); und nach der Benutzung des Instruments und des Endwerkzeuges Entfernung des Endwerkzeuges (14) von der Welle (56).

29. Verfahren nach Anspruch 28 zur Verwendung des endoskopischen Instrumentensystems nach irgendeinem der Ansprüche 1-17, wobei das Endwerkzeug (14) aus einer Vielzahl von Endwerkzeugen (14) ausgewählt wird, die unterschiedliche Konfigurationen zur Ausführung unterschiedlicher Aufgaben besitzen.

#### Revendications

1. Système (10) d'instrument endoscopique comportant : un instrument comportant une portion de préhension (12) ayant des moyens (36) pour la préhension dudit instrument, des moyens formant un fût (56) s'étendant depuis lesdits moyens de préhension et des moyens d'actionnement dudit instrument ; et un outil d'extrémité (14) de l'instrument comportant des moyens de mâchoires (92, 94) formant une paire de mâchoires, caractérisé en ce que ledit outil d'extrémité (14) comporte des moyens de support (88) qui supportent lesdits moyens de mâchoires (92, 94), de sorte que lesdits moyens de support (88) sont montés de manière amovible sur une extrémité dudit fût (56) et comportent des moyens (124) pour coopérer avec lesdits moyens d'actionnement, ce par quoi ledit outil d'extrémité (14) est mis en oeuvre par lesdits moyens d'actionnement de sorte qu'au moins une des mâchoires (92, 94) peut bouger par rapport à l'autre.
2. Système d'instrument endoscopique selon la revendication 1, caractérisé en ce que lesdits moyens de préhension (36) mettent en oeuvre les-

dits moyens d'actionnement.

3. Système d'instrument endoscopique selon la revendication 2, caractérisé en ce que lesdits moyens d'actionnement s'étendent dans ledit fût (56) depuis lesdits moyens de préhension (36) jusqu'à un outil d'extrémité (14) qui y est fixé.
4. Système d'instrument endoscopique selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit outil d'extrémité (14) comporte des ciseaux (92, 94).
5. Système d'instrument endoscopique selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit outil d'extrémité (14) est fixé à ladite extrémité du fût (56) par un assemblage à vis (82, 90).
6. Système d'instrument endoscopique selon l'une quelconque des revendications précédentes, caractérisé en ce que lesdits moyens d'actionnement comportent une tige (64) qui s'étend depuis lesdits moyens de préhension (36) jusqu'à un outil d'extrémité (14) monté sur ladite extrémité (80) du fût.
7. Système d'instrument endoscopique selon la revendication 6, caractérisé en ce que ledit outil d'extrémité (14) comporte des moyens pour coopérer avec ladite tige (64).
8. Système d'instrument endoscopique selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit outil d'extrémité (14) comporte des moyens de liaison (106, 108) qui se terminent par une extrémité élargie (124), et lesdits moyens d'actionnement comportent des moyens pour coopérer, avec possibilité de désaccouplement, avec ladite extrémité élargie.
9. Système d'instrument endoscopique selon la revendication 8, caractérisé en ce que lesdits moyens de coopération comportent une chape (86) destinée à recevoir ladite extrémité élargie (124) d'un outil d'extrémité (14) attaché.
10. Système d'instrument endoscopique selon la revendication 8, caractérisé en ce que le support (88) de l'outil d'extrémité (14), susceptible d'être attaché à ladite extrémité du fût (56), reçoit lesdits moyens de liaison (106, 108), une première desdites mâchoires étant montée à rotation sur ledit support et sur ledit moyen de liaison (106, 108) et une seconde desdites mâchoires étant montée sur ledit support (88), ce par quoi un mouvement desdits moyens de liaison (106, 108), en réponse au mouvement desdits moyens d'actionnement, provoque un pivotement de ladite première mâchoire par rap-

port audit support et par rapport à ladite seconde mâchoire.

11. Système d'instrument endoscopique selon la revendication 10, caractérisé en ce que lesdits moyens de liaison (106, 108) comportent un arbre de tête (118) qui porte ladite extrémité élargie (124) et qui est monté à coulissement dans ledit support (88), et un premier élément de liaison (106, 108) reliant ledit arbre de tête (118) et ladite première mâchoire (92, 94), ce par quoi le mouvement dudit arbre de tête (118) est transmis par ledit élément de liaison (106, 108) afin de provoquer le pivotement de ladite première mâchoire. 5
12. Système d'instrument endoscopique selon la revendication 11, caractérisé en ce que ladite seconde mâchoire est montée à rotation sur ledit support (88), et lesdits moyens de liaison (106, 108) comportent un second élément de liaison 10 reliant ledit arbre de tête (118) et ladite seconde mâchoire, ce par quoi le mouvement coulissant dudit arbre de tête provoque une rotation relative des première et seconde mâchoires l'une par rapport à l'autre dans un mouvement de ciseaux. 15
13. Système d'instrument endoscopique selon la revendication 12, caractérisé en ce que lesdites première et seconde mâchoires (92, 94) peuvent être notamment les mâchoires d'un ciseau, d'un outil de dissection, d'une pince ou d'un outil à biopsie. 20
14. Système d'instrument endoscopique selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit fût (56) est monté à rotation sur lesdits moyens de préhension (36). 25
15. Système d'instrument endoscopique selon l'une quelconque des revendications 1 à 13, caractérisé en ce que ledit fût (56) est démontable desdits moyens de préhension (36). 30
16. Système d'instrument endoscopique selon l'une quelconque des revendications précédentes, caractérisé en ce que lesdits moyens de préhension comportent un orifice (57, 58) pour le lavage dudit fût. 35
17. Système d'instrument endoscopique selon la revendication 16, caractérisé en ce que ledit orifice (57, 58) comporte un tube (57) qui est fixé dans lesdits moyens de préhension et qui communique avec ledit fût (56). 40
18. Outil d'extrémité jetable (14) comportant des moyens de mâchoires (92, 94) formant une paire de mâchoires et adapté pour son utilisation avec un instrument endoscopique du type comportant une 45

portion de préhension (12) comportant des moyens (36) pour la préhension dudit instrument, des moyens formant un fût (56) allongé qui s'étend depuis lesdits moyens de préhension (36) et des moyens pour actionner ledit instrument ; l'outil d'extrémité (14) étant caractérisé en ce qu'il comporte des moyens de support (88), de préférence en matière plastique, qui supportent lesdits moyens de mâchoires (92, 94) de sorte que les mâchoires (92, 94) peuvent se déplacer l'une par rapport à l'autre, et en ce que lesdits moyens de support (88) sont susceptibles d'être montés sur une extrémité (80) du fût de manière à permettre une coopération avec les moyens d'actionnement de sorte que la mise en oeuvre des moyens d'actionnement provoque un déplacement desdits moyens de mâchoires (92, 94).

19. Outil d'extrémité selon la revendication 18, caractérisé en ce que lesdits moyens de support (88) comportent une extrémité interne (90) susceptible d'être montée sur ladite extrémité (80) du fût.
20. Outil d'extrémité selon la revendication 19, caractérisé en ce que ladite extrémité interne comporte une portion filetée prévue pour être vissée dans ladite extrémité (80) du fût.
21. Outil d'extrémité selon l'une quelconque des revendications 18 à 20, caractérisé en ce que lesdits moyens de mâchoires (92, 94) comportent un arbre de tête (118) monté à coulissement dans lesdits moyens de support (88) et prévu pour coopérer avec lesdits moyens d'actionnement.
22. Outil d'extrémité selon la revendication 21 prise en combinaison avec l'une des revendications 19 ou 20, caractérisé en ce que ledit arbre de tête (118) comporte une extrémité élargie (124) qui s'étend depuis ladite extrémité interne et qui est prévue pour coopérer avec lesdits moyens d'actionnement.
23. Outil d'extrémité selon l'une quelconque des revendications 18 à 22, caractérisé en ce que lesdits moyens de mâchoires (92, 94) comportent une première et une seconde mâchoire, lesdites mâchoires étant montées à pivotement sur lesdits moyens de support (88).
24. Un outil d'extrémité selon la revendication 23 prise en combinaison avec l'une des revendications 21 ou 22, caractérisé en ce que lesdits moyens de mâchoires (92, 94) comportent un premier et un second moyen de liaison (106, 108) reliant lesdites première et seconde mâchoires (92, 94), respectivement, avec ledit arbre de tête (118), ce par quoi, dans la mise en oeuvre d'un instrument comportant ledit outil d'extrémité (14), un mouvement alternatif dudit arbre de tête (118) par rapport audit moyen de 50

support, en réponse auxdits moyens d'actionnement, provoque un pivotement relatif des mâchoires (92, 94) l'une par rapport à l'autre.

25. Outil d'extrémité selon l'une des revendications 23 ou 24, caractérisé en ce que lesdites mâchoires (92, 94) forment une paire de ciseaux, une pince, un outil de biopsie ou un outil de dissection. 5
26. Outil d'extrémité selon l'une quelconque des revendications 18 à 25, caractérisé en ce que lesdits moyens de support sont réalisés en polyimide d'éther renforcé par du verre, en polyetheretherketone renforcé par du verre, ou en polyethersulfone renforcé par du verre. 10
27. Outil d'extrémité jetable (14) selon la revendication 18, dans lequel l'outil d'extrémité est prévu pour être utilisé avec un instrument (10) dans lequel ledit fût (56) comporte une extrémité ouverte filetée (82) à l'opposé desdits moyens de préhension (36), lesdits moyens d'actionnement dudit instrument comportant une tige (64) montée à coulissement à l'intérieur dudit fût (56) sous l'action desdits moyens de préhension et comportant une extrémité en forme de chape adjacente à ladite extrémité, l'outil d'extrémité (14) étant caractérisé en ce qu'il comporte un support (88) comportant une extrémité interne filetée (90) prévue pour être vissée dans ladite extrémité (80) du fût ; un arbre de tête (118) est monté à coulissement dans ledit support (88) et comporte une portion élargie (124) qui s'étend vers l'extérieur depuis ladite extrémité interne prévue pour coopérer, avec possibilité de désaccouplement, avec ladite extrémité (86) en forme de chape ; des premier et second moyens de liaison (106, 108) sont montés pivotants sur ledit arbre de tête (78) dans ledit support (88) ; et de plus caractérisé en ce que lesdites première et seconde mâchoires (92, 94) sont montées à rotation sur ledit support (88) pour effectuer un mouvement de ciseau, lesdites première et seconde mâchoires (92, 94) étant liées à rotation auxdits premier et second moyens de liaison (106, 108), respectivement, ce par quoi, dans la mise en oeuvre dudit instrument comportant ledit outil d'extrémité (14), un mouvement de va-et-vient de ladite tige (64) permet d'imprimer un mouvement de va-et-vient audit arbre de tête (118), ce par quoi les mâchoires (92, 94) sont animées d'un mouvement de ciseaux. 20 25 30 35 40 45 50
28. Procédé pour l'utilisation d'un système d'instrument endoscopique (10) selon l'une quelconque des revendications 1 à 17, comportant les étapes de : 55
- choisir un instrument endoscopique (10) comportant une portion de préhension (12) munie de moyens (36) pour tenir ledit instrument, des moyens formant un fût (56) qui s'étendent depuis lesdits moyens de préhension, et des moyens

d'actionnement dudit instrument ; choisir un outil d'extrémité de l'instrument (14) d'un type ayant des moyens pour monter ledit outil d'extrémité (14) de manière amovible sur une extrémité dudit fût (56) et comportant des moyens pour coopérer avec lesdits moyens d'actionnement, ce par quoi ledit outil d'extrémité (14) est susceptible d'être manoeuvré par lesdits moyens d'actionnement : monter ledit outil d'extrémité (14) sur ledit fût (56) ; et, suite à l'utilisation dudit instrument et dudit outil d'extrémité, retirer ledit outil d'extrémité (14) dudit fût (56).

29. Procédé selon la revendication 28 pour utiliser un système d'instrument endoscopique selon l'une quelconque des revendications 1 à 17 dans lequel ledit outil d'extrémité (14) est choisi parmi une pluralité d'outils d'extrémité (14) ayant différentes configurations pour réaliser différentes tâches.

